



FNAL Factories Production Status

Giorgio Apollinari

Fermilab

Jun. 10-15, 2002 - CERN

EMU Meeting



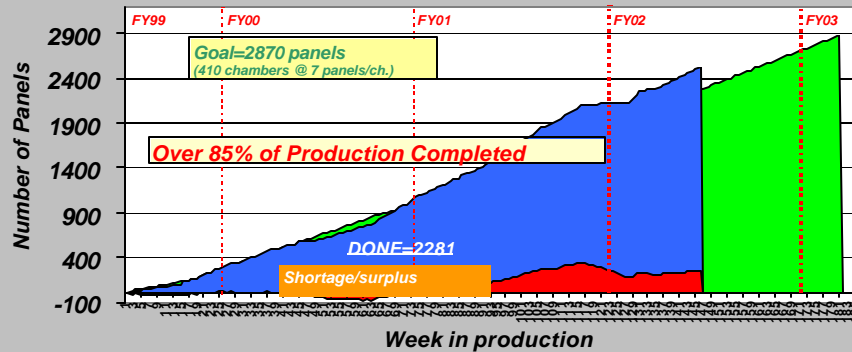
Outline

- **FNAL Production Activities**
 - Panel production
 - Chamber Production
- **Preparation/Procurement Plans**
 - Cooling Plates Procurement
- **Other FNAL Activities**
 - Chamber Parts Shipments
 - Documentation and Chamber Specification

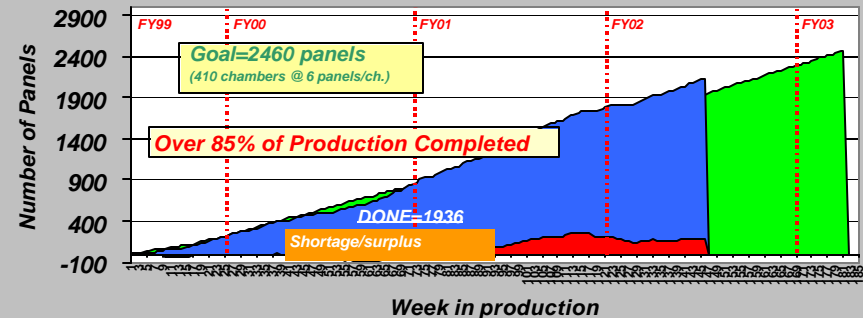


Lab 8 Status – Panel Factory

Muon CMS Production Status at FNAL
Panels Production at Axxiom.



Muon CMS Production Status at FNAL
Panels Production at GERBER



Panel Machining in full-speed production as of ~ Jan '00

- Completed machining of ME234/2 panels (FNAL Production)
- Completed machining of ME2/1, ME3/1 & ME4/1 panels (PNPI Production)
- Completed machining of ME1/2 panels (50% of IHEP Production)
- Complete machining of 60% of ME1/3 panels
 - 100% completion expected by Jun-Jul. '02
- Will machine spares next (completion expected by Jul-Aug. '02)

COMPLETED 89% of Re-scoped Production (ME4/1 INCLUDED)



Lab 8 Status - Spares (1)

- **“Detector” Production**
 - 144 ME234/2, 36 ME2/1 (ME3/1 & ME4/1), 72 ME1/2 (ME1/3)
- **Baseline Needs**
 - 148 (144+4) ME234/2, 38 (36+2) ME2/1 (ME3/1 & ME4/1), 74 (72+2) ME1/2 (ME1/3)
- **Panels Usage**
 - *FNAL Extra Panels Usage Experience (over ~ 100 chambers)*
 - ~ 2 chambers (~14 panels) needed to replace bad panels
 - 006 (dripping RTV)
 - Bowed/leaking panels*
 - ~ 2 chambers (~14 panels) needed to replace production mistakes
 - IHEP has reported similar problems with leaking panels.
- **First Proposal**
 - Since there is no need to keep at FNAL Integrated foreign Prototypes (P3,P4,..), we propose to ship them to the foreign sites in order to upgrade them to fully functional chambers. At FNAL we have upgraded P2” to chamber ME234/2-100.
 - DSR (Device Service Record) added to travelers
 - 18 items for P2”, including SIPs installation, change Anode Protection Boards, etc.



Lab 8 Status - Spares (2)

- **Spare Panels**
 - We believe we have ~162 left-over panels
 - Only ~5% spares copper-clad FR4 skins procured back in '98
 - Factory (GE production line) closed shortly thereafter.
- **Second Proposal**
 - **ME234/2 Spares**
 - Need 4 chambers (144+**4**) + 5 chambers (replacement of *Extra Panels Usage*) +2 chambers (Insurance) = 11 Additional Chambers (77 Panels)
 - **ME1/3, ME1/2 Spares**
 - Need 4 chambers (72+**2**, 72+**2**) + 6 chambers (expected replacement of *Extra Panels Usage*, 3 ME1/2 & 3 ME1/3) = 10 Additional Chambers (35 panels)
 - **ME2/1, ME3/1 & ME4/1**
 - Need 6 chambers (36+**2**, 36+**2**, 36+**2**) + 6 chambers (expected replacement of *Extra Panels Usage*, 2 ME2/1, 2 ME3/1 & 2 ME4/1) = 12 Additional Chambers (42 panels)
 - **77+35+42 = 154 panels needed it's going to be close !...**
 - **Follow previous order in production to reflect importance of low-?? detectors & MB/ME overlap**



MP9 Status – Chamber Factory

- **Production Issues**

- Requested by L2-L3 to terminate FNAL production by end of March '03 (294 days to go) .
- Increase production rate to 5.6 chambers/month.
- Review of Manpower needs in MP9 (Oct. '01).
 - *190 WFTE hours/chamber, need 8.4 FTE between Nov. '01 and Mar. '03 to complete project.*
- Requested and Obtained
 - Close the program of visitors training and use the available funding to increase the trained MP9 assembly personnel from 7 to 8 technicians.
 - Provide funding to cover 0.4 FTE in overtime distributed over the remaining ~15 months of production.



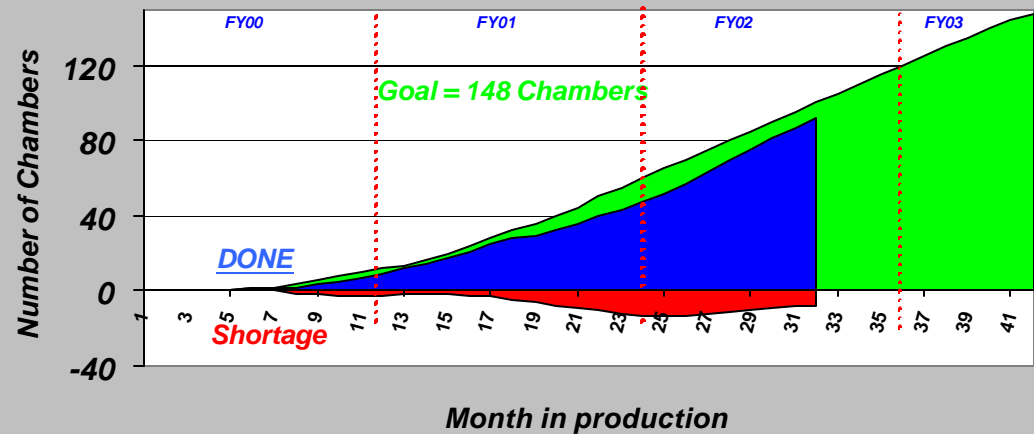
MP9 Status (cont.)

- 92 ME234/2 Production Chambers assembled (62%)

To	Total ME234/2	Total ME1/2	Total ME2/1	Total ME1/3	Total ME3/1	Total ME4/1
10/31/1999	-	-	-	-	-	-
11/30/1999	-	-	-	-	-	-
12/31/1999	-	-	-	-	-	-
1/31/2000	-	1	-	-	-	-
2/28/2000	-	1	-	-	-	-
3/31/2000	1	-	-	-	-	-
4/30/2000	1	-	-	-	-	-
5/31/2000	-	-	-	-	-	-
6/30/2000	2	-	-	-	1	-
7/31/2000	1	-	-	-	-	-
8/31/2000	2	-	-	-	-	-
9/30/2000	2	-	-	-	-	-
	9	2	-	-	1	-
	9	2	-	-	1	-
10/31/2000	3	-	-	-	-	-
11/30/2000	3	-	-	1	-	-
12/31/2000	3	-	-	-	-	-
1/31/2001	3	-	-	-	-	-
2/28/2001	4	-	-	-	-	-
3/31/2001	3	-	-	-	-	-
4/30/2001	2	-	-	-	-	-
5/31/2001	2	-	-	-	-	-
6/30/2001	4	-	-	-	-	1
7/31/2001	4	-	-	-	-	-
8/31/2001	3	-	-	-	-	-
9/30/2001	3	-	-	-	-	-
	38	-	-	1	-	1
	47	2	-	1	1	1
10/31/2001	5	-	-	-	-	-
11/30/2001	5	-	-	-	-	-
12/31/2001	6	-	-	-	-	-
1/31/2002	6	-	-	-	-	-
2/28/2002	6	-	-	-	-	-
3/31/2002	6	-	-	-	-	-
4/30/2002	6	-	-	-	-	-
5/31/2002	5	-	-	-	-	-
6/30/2002	-	-	-	-	-	-
7/31/2002	-	-	-	-	-	-
8/31/2002	-	-	-	-	-	-
9/30/2002	-	-	-	-	-	-
	45	-	-	-	-	-
	92	2	-	1	1	1
10/31/2002	-	-	-	-	-	-
11/30/2002	-	-	-	-	-	-
12/31/2002	-	-	-	-	-	-
1/31/2003	-	-	-	-	-	-
2/28/2003	-	-	-	-	-	-
3/31/2003	-	-	-	-	-	-
4/30/2003	-	-	-	-	-	-
5/31/2003	-	-	-	-	-	-
6/30/2003	-	-	-	-	-	-
7/31/2003	-	-	-	-	-	-
8/31/2003	-	-	-	-	-	-
9/30/2003	-	-	-	-	-	-
	-	-	-	-	-	-
	92	2	-	1	1	1

38
47
5
5
6
6
6
6
6
5
-

CSC Production at MP9(ME234/2)



Production Rate

- 3.3 Chamber/ month in FY01
- 5.6 Chambers/month in FY02 (Oct '01-May '02)
- ~6 Chambers/month in last 6 months



MP9 Status (cont.)

- **Production “odd-balls” issues.**
 - **Chamber 001 (back from UF) fixed in March**
 - Leaky Chamber
 - Frame Updated for new HV Connector
 - No “Missing Holes for Anode Cable Bundle Strain Relief Problem” a-la-003 (UCLA issue)
 - **Chamber 006 to be brought back to bare panels and re-scrubbed & started from scratch.**
 - **P2” turned into Production Chamber ME234/2-100**
- **Chamber Storage issues.**
 - **30 Chambers at FNAL ready for Shipment.**
 - **Good News**
 - Move Cleaning Machine to Lab 5 (CMS-HAD Assembly Factory), all MP9 available for Chamber Storage (~40-50 Chamber autonomy).
 - **Bad News**
 - Will lose ICB storage space (under crane coverage) in July '02.
 - US Final Assembly Sites to ship chambers to CERN by end Aug. '02

US Sites: Start sending those chambers to CERN



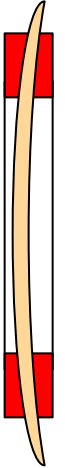
Chamber Production Experience

- **New Lessons (Since Dec '01)**

- Bowed Panels

- 2 cases (out of ~250, for a ~1% failure rate) of excessively bowed anode panels.
- Unable to perform standard QC step of Anode HV test in Air and Anode Panel Cleaning.
 - Tried unsuccessfully “blind-chamber” Assembly.

~20 uncut panels at FNAL rejected at Inspection because of “excessive bowing”. *Available for the taking.*



- Bad Wire

- 2 additional Chamber in CY02 failed HV testing because of “bad wire” problems
 - One with flaking Gold (wire manufacturing problem).
 - One with extraneous metal on wire, possibly aluminum shaving from Production floor.
- Potentially big problem (impossible to create an effective QC program to screen bad wire), actually turns out to be not very serious.

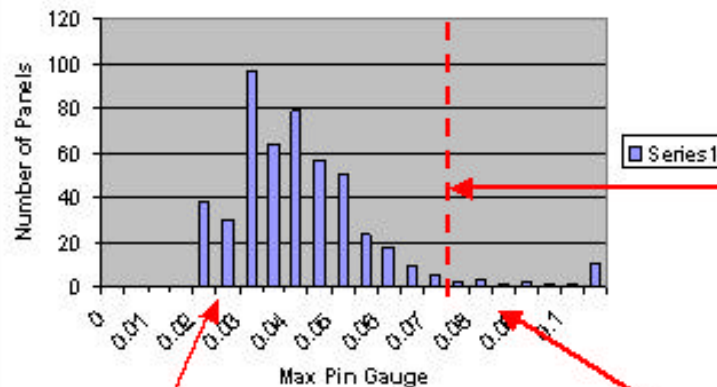


Chamber Production Experience Bowed panels



Materials - Inspection

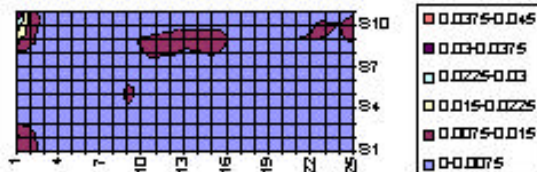
Pin Gauge Measurements
Summary Jan 00



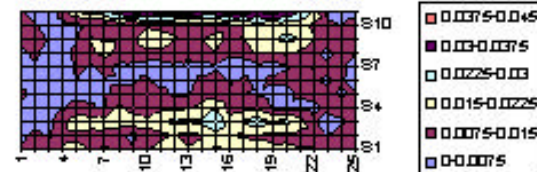
• Panel Inspection

- Flatness Measurements performed with a Laser and a Ping Gauge probe
 - Good Correlation
- Rejection Criteria
 - Pin Gauge > 80 mils
- ~14/600 rejected 5'x12'
- ~2/200 rejected 4'x12'
- ~2% "rejection" factor

Panel 214 Cat T x-bowling



Panel 286 Cat T x-bowling



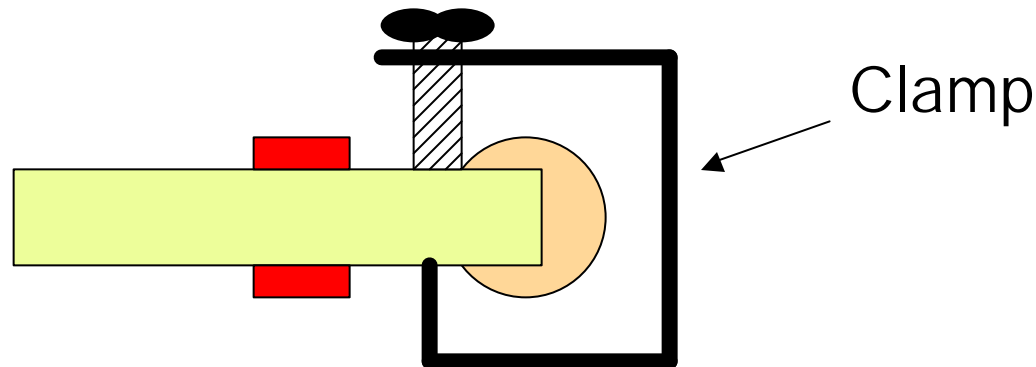


Chamber Production Experience (cont.)

- **New Lessons**

- Thick Panels

- 1 case (out of ~250, for a ~0.5% failure rate) of thick anode panel, preventing installation of Combs.



- Fixable.

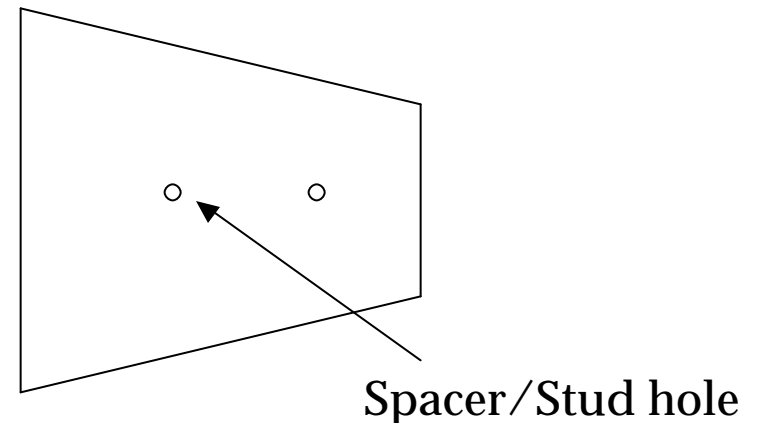
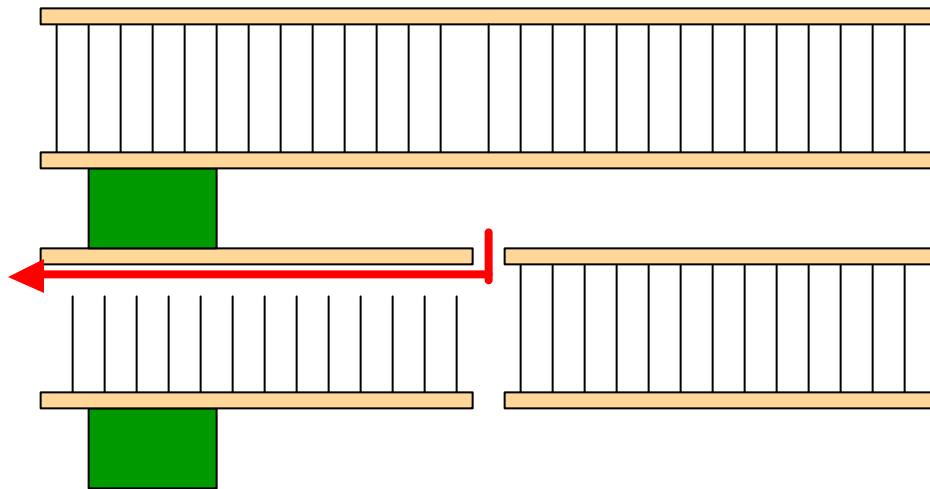
- Gap Bars Counter-bore

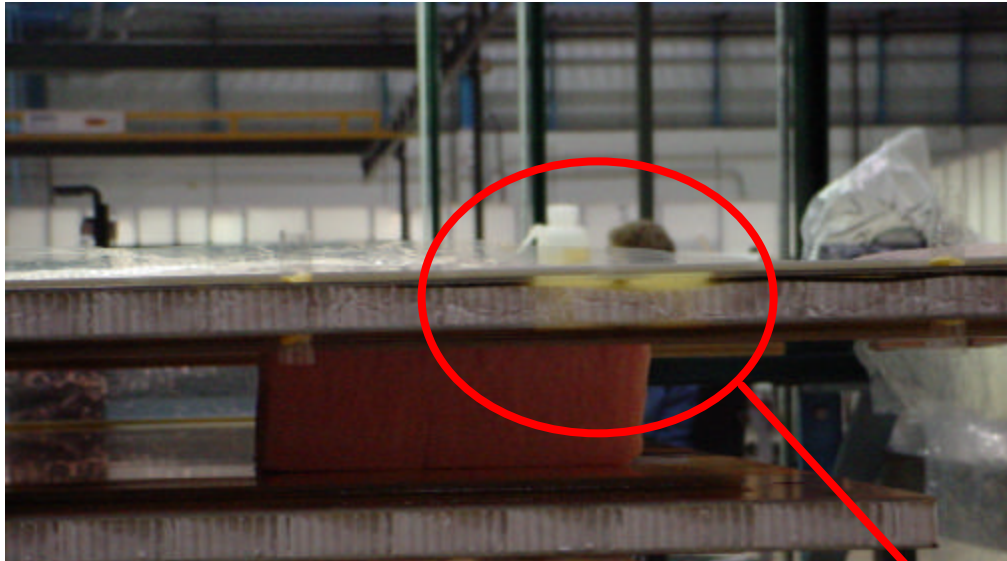
- 2 Gap Bars with improperly machined counter-bores (40-50 mils vs. ~80 mils deep counter-bores for O-rings).
- Inspect, catch and fix on Production floor.



Chamber Production Experience (cont.)

- Delaminating Panels (*biggest worry at the moment*)
 - Several cases (~3, one of which at IHEP) of suspected or real delamination (absence of glue between polycarbonate honeycomb and FR4 skin)
 - Potential leak from center stud/spacer holes to outside of chamber
 - Worrisome because showing more and more frequently on low-numbered panels (first Plascore production, learning curve effect ?)
 - Investigating ways to fix problem
 - Seal Stud hole with “Gas Sleeve”-like cylinder
 - Inject epoxy on outside perimeter.



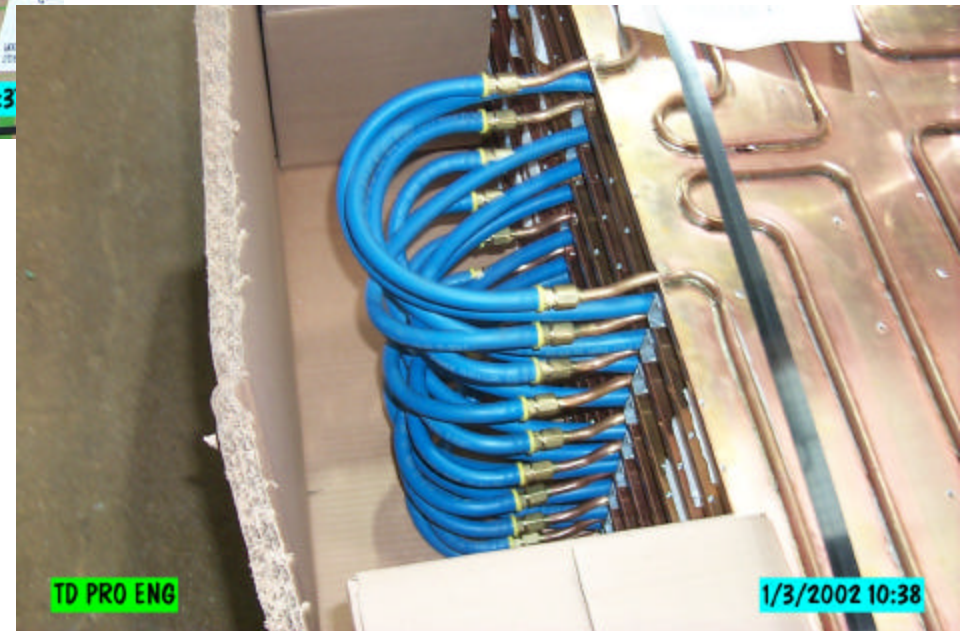




ME234/2 Cooling Plates



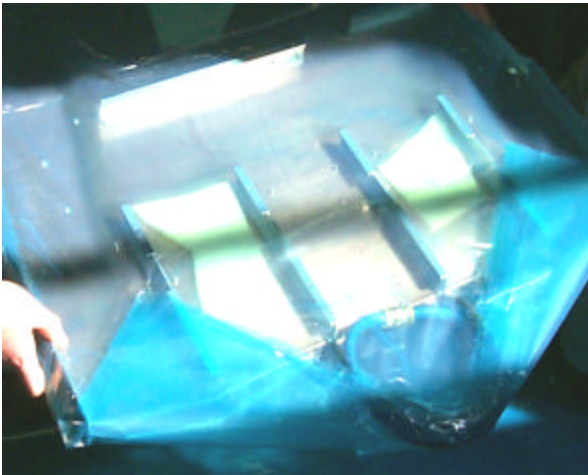
- All 150 ME234/2 Cooling Plates at US FAST sites.
 - UF reported a bent tube problem. Replacement available at FNAL.





ME1/2 Cooling Plates

- **All ME1/2 Cooling Plates Shipped**
 - 74 ME1/2 Cooling Plates sole sourced to “Unique Manufacturing”. Small saving by using “copper scraps” from ME234/2 production (710 \$/cooling plates+FNAL overhead).
- **Procure “treated-wood” boxes.**
 - ME1/2 boxed and shipped





(History of) ME2/1 Cooling Plates

- **Procurement of PNPI (ME2/1-ME3/1) Cooling Plates**
 - **Procured 76 ME2/1 Cooling plates**
 - 38 for ME2/1 Chambers.
 - 38 for ME3/1 Chambers.
 - L2-L3 approved the limited (or null ?) risk in assuming for ME3/1 the same Cooling Plate design of ME2/1 chambers.
 - **All plates delivered at FNAL and shipped to PNPI by June 5th '02.**
- **Procurement of ME1/3 Cooling Plate to start after ME1/3 Integration (Jul '02)**



Chamber Shipments

• Chamber Shipments

• Plans

Table 1.

Chamber Type	Panel Completion	Bulk Shipment*	Shipment Dates
ME2/1 (38 chambers+spares)	3/1/01	C_{all}, U, P, F	8/1/01
ME1/2 (72 chambers)	5/1/01	C_{all}, U, P, F	8/15/01
ME1/2 (32 chambers+spares)	8/1/01	P	11/1/01
ME3/1 (38 chambers+spares)	11/1/01	U, P	1/1/02
ME4/1 (38 chambers+spares)	2/1/02	U, P	4/1/02
ME1/3 (74 chambers+spares)	8/1/02	U, P	10/1/02
PNPI HV Harnesses (118)		24 H	7/15/01
		20 H	12/15/01
		20 H	4/15/02
		20 H	8/15/02
		20 H	12/15/02
IHEP HV Harnesses (152)		14 H	3/31/03
		24 H	7/15/01
		20 H	12/15/01
		20 H	4/15/02
		20 H	8/15/02
		24 H	12/15/02
		24 H	3/31/03
		20 H	8/15/03

• At Destination

- **PNPI** ~Oct. '01
- **IHEP** ~Dec. '01

• Will be at Destination

- **PNPI** ~Jul. '02

* Bulk Shipments consist of a SINGLE lot of parts made up of the following groups of parts:
 C = common parts and hardware for all chambers to be made at either PNPI or IHEP,
 U = unique, or chamber type specific, parts (wire fix. bars, gap bars, isolation strips, gas tubes), P =
 machined panels (chamber type specific),
 F = frame parts (common frame parts, machined and raw extrusions),
 H = high voltage harnesses (common); this schedule is likely to be advance



Future PNPI Chamber Shipping Plans

3rd. Shipment – June '02

- ME4/1 Panels, Unique Parts all in house
- ME2/1 & ME3/1 Cooling Plates
- Integration Parts and hardware

Large Shipments to PNPI Completed

4th. Shipment- June '03 or earlier

- (~6-12) Spare Chamber Parts
- Various Prototypes (if so decided..)
- Integration Parts & hardware



Future IHEP Chamber Shipping Plans

2nd. Shipment – May '02

- ME1/2 Cooling Plates
- ME1/2 Integration Parts and Hardware

3rd. Shipment – Nov., '02

- ME1/3 Panels & Chamber parts
 - 50% completed , cleaned and packed
- ME1/3 Integration Parts and Hardware
 - Cooling plates are items on critical path if released for procurement only in Jul '02

4th. Shipment – June '03 or earlier

- (~4-10) Spare Chamber Parts, Prototypes
- Integration Parts and Hardware



Integration Shipments Change of Responsibility

- **Since Jan '02, Oleg Prokofiev is new Manager for “FAST Sites Integration Shipments” to foreign sites**
 - **WBS 1.6.2.1.8**
 - **Includes “Dubna” Shipments**

Subject: Re: [Fwd: New Responsibilities for FAST Site Shipments]

Date: Thu, 24 Jan 2002 18:19:15 -0500 (EST)

From: [Guenakh Mitselmakher <mitselmakher@phys.ufl.edu>](mailto:mitselmakher@phys.ufl.edu)

To: [Giorgio Apollinari <apollina@fnal.gov>](mailto:apollina@fnal.gov)

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[Zweibohmer John <johnz@fnal.gov>](mailto:johnz@fnal.gov), [Yarba Victor <yarba@fnal.gov>](mailto:yarba@fnal.gov)

I would like to thank Giorgio for the work he has done to organize shipments, and I wish Oleg success with his new responsibilities.

Oleg will need help not only from the L2/L3 management.

I expect that Giorgio and in particular Victor Yarba as the foreign sites coordinator will continue to help Oleg at Fermilab.

Victor was very efficient in helping to organize shipments: e.g he helped to solve complicated problems related to property transfer, customs etc.

Cheers

Guenakh



Configuration Releases

- **Chamber Configuration Release**
 - Needed to allow PNPI/IHEP to finalize the chamber parts “procurement” (typically they still have to machine the frames) and allow them to go into chamber production.
 - Frame finalization intimately connected to Integration finalization (ex: ME1/2)
 - ME234/2 CC in Spring 2000
 - ME2/1-Rev 1 CC in Jan. 2002
 - ME1/2 CC in Nov. 2001
 - ME3/1 CC in Jun. 2002
 - ME1/3 Jul. '02 ?
 - ME4/1 Sep. '02 ?
- **All Chambers Configuration Releases depends and follow the Chamber Integration Releases.**

Configuration:	1					Release Date:	9/13/2001
Revision:	0					Revision Date:	
<u>Changed</u>							
<u>Rev. (*)</u>	<u>Size</u>	<u>Dwg. No.</u>	<u>Rev.</u>	<u>Description</u>			
**	ME-	368219	D	Frame Assembly			
	ME-	368172	A	Extrusion, Top Small End			
	ME-	368173	A	Extrusion, Bottom Small End			
	ME-	368174	B	Extrusion, Top Anode Side			
	ME-	368175	B	Extrusion, Bottom Anode Side			
*	ME-	368176	C	Extrusion, Top HV Side			
	ME-	368177	B	Extrusion, Bottom HV Side			
	ME-	368178	B	Extrusion, Top Big End			
	MD-	368179	A	Extrusion, Bottom Big End			
	MB-	368180	B	Panel, Small End			
	MC-	368181	B	Panel, HV side			
	MC-	368182	B	Panel, Big End			
	MB-	368074	C	Plate, Big End			
	MB-	368075	B	Plate, Small End			
	MD-	368422	A	Panel, Anode Side			
[+] Change Description:		As Released for Production;					
Test strip connector mounting holes must be installed at PNPI							
** Major sub-assembly components listed below this item.							

http://tdserver1.fnal.gov/project/uscmsemu/Configuration_Control_Documents/Released_Configurations/



Chamber Specifications

Spec. #5520-ES-368037 Rev. 0

Released: 3/30/02
Last updated:



Fermi National Accelerator Laboratory
Batavia, IL 60510



TEST & INSPECTION SPECIFICATIONS
5520-ES-368037

for
CMS Endcap Muon
Cathode Strip Chambers

Prepared by: N. Chester

Approved by:

Andrew Koshchey
George Apollinari
Nelson Chester
Oleg Prokofiev

File: Test&Inspect.doc

Page 1 of 6

Printed: 4/6/2002

Chamber Specification Document

- Should have been one of the first Project documents published for CMS-EMU
- Good input from PNPI scrutiny
- Released.



Chamber Specifications (cont.)

4.0 WOUND AND SOLDERED WIRE ANODE PANELS

- 4.1 When the 200 micron wires are set in place on an Anode Panel the Winding Combs must be adjusted so that all of these wires are **equally centered to the extent possible**. No wire may be less than 0.010" from the edge of the wire fixation bar pad.

The tension for 200 micron wires must generally be 500 grams +/- 50 grams. Tensions outside of this range can be accepted according to the following table:

Location	Allowable 200 [?] Wire Tension Range (grams)		
	ME1/2 - ME1/3	ME2/1 - ME4/1	ME234/2
Narrow End	200 - 800	200 - 800	200 - 800
1st button	350 - 800	350 - 800	300 - 800
2nd button	400 - 800	400 - 800	350 - 800
3rd button	N/A	N/A	400 - 800
4th button	N/A	N/A	450 - 800
Wide End	450 - 800	450 - 800	450 - 800

- 4.2 During Wire Winding, the 50[?] wire should be **centered on the Wire Fixation Bars to the extent possible** based on the setup activity of 4.1. . No wire may be less than 0.010" from the edge of **the wire fixation bar pad**.
- 4.3 The tension in the 50[?] wires must generally be 260 grams +/-26 grams. Tensions outside of this **range can be accepted the according to following table:**

Location	Allowable 50 [?] Wire Tension Range (grams)		
	ME1/2 - ME1/3	ME2/1 - ME4/1	ME234/2
HV SEGMENT 1 (NE)	200 - 300	200 - 300	200 - 300
HV SEGMENT 2	200 - 300	234 - 300	200 - 300
HV SEGMENT 3	234 - 300	234 - 300	200 - 300
HV SEGMENT 4	N/A	N/A	234 - 300
HV SEGMENT 5 (WE)	N/A	N/A	234 - 300

- 4.4 Wires cut from behind Wire Fixation Bar Solder Pads must be cut flush with solder pad to the extent possible. **Not more than 0.010" (0.254 mm) of wire** may extend out beyond the solder pad.

- 4.5 The Allowable Spacing between Anode Panel Wires Centers:

Between 50[?] - 50[?] Wires = Nominal* +/- 0.014" (+/- 0.35 mm)

Between 50[?] - 200[?] Wires = Nominal* +/- 0.024" (+/- 0.60 mm)

*Nominal is 0.1245" (3.16 mm) for 10^o Chambers and 0.1228" (3.12 mm) for 20^o Chambers.

The total accumulated error in wire spacing across all of the wires may **not be larger than 0.070" (1.778 mm).**

+/- 350[?] m on 50-50[?] m wire distance
+/- 600[?] m on 200-50[?] m wire distance

• Problem (solved?)

• Easy to achieve at FNAL

- Purdue system with two cameras. From two measured distances we can determine the maximum and minimum distances between 2 pair of wires.

• Harder at PNPI/IHEP

- Purdue system with one camera only.
- Oleg, Gyula and Adam demonstrated possibility of catching up to ~80-90% of problems using reasonable assumptions and one camera only.



FNAL FY02 SOW Milestones (1/4)

WBS	Program Milestones	Current Milestone Date	Status
1.8.1.1.23	Sign off ME1/3 Chamber Drawings	12/07/01	Delayed
1.8.1.1.30	Sign-off Integration Drawings for ME2/1 Chambers	12/07/01	Achieved
1.8.1.1.31	Sign-off Integration Drawings for ME3/1 Chambers	02/07/02	Achieved
1.8.1.1.32	Sign-off Integration Drawings for ME1/3 Chambers	12/07/01	Delayed
1.8.1.1.33	Sign-off Integration Drawings for ME4/1 Chambers	04/08/02	Delayed
1.8.4.2.11	" +42=106 ME23/2, +20=40 ME23/1, +36=72 ME1/23 panels made"	10/01/01	Achieved
1.8.4.2.14	38 ME4/1 panels delivered	06/03/02	<i>On Track</i>
1.8.4.3.9	+54=66 ME23/2 chambers assembled	01/31/02	Achieved
1.8.4.3.10	+54=120 ME23/2 chambers assembled	09/30/02	<i>On Track</i>
1.10.1.1.2	52 ME23/2s assembled at Fermilab	10/30/01	Achieved
1.10.1.1.3	57 ME23/2s assembled at Fermilab	11/30/01	Achieved
1.10.1.1.4	61 ME23/2s assembled at Fermilab	12/31/01	Achieved
1.10.1.1.5	66 ME23/2s assembled at Fermilab	01/31/02	Achieved
1.10.1.1.6	72 ME23/2s assembled at Fermilab	02/28/02	Achieved
1.10.1.1.7	78 ME23/2s assembled at Fermilab	03/31/02	Achieved



FNAL FY02 SOW Milestones (2/4)

WBS	Program Milestones	Current Milestone Date	Status
1.10.1.1.8	84 ME23/2s assembled at Fermilab	04/30/02	Achieved
1.10.1.1.9	90 ME23/2s assembled at Fermilab	05/31/02	Achieved
1.10.1.1.10	96 ME23/2s assembled at Fermilab	06/30/02	On Track
1.10.1.1.11	102 ME23/2s assembled at Fermilab	07/31/02	On Track
1.10.1.1.12	108 ME23/2s assembled at Fermilab	08/31/02	On Track
1.10.1.1.13	114 ME23/2s assembled at Fermilab	09/30/02	On Track
1.10.1.2.2	21 Chambers shipped to UCLA FAST Site	12/17/01	Achieved
1.10.1.2.3	26 Chambers shipped to UCLA FAST Site	12/17/01	Achieved
1.10.1.2.4	31 Chambers shipped to UCLA FAST Site	03/15/02	Achieved
1.10.1.2.5	36 Chambers shipped to UCLA FAST Site	03/15/02	Achieved
1.10.1.2.6	41 Chambers shipped to UCLA FAST Site	06/17/02	On Track
1.10.1.2.7	46 Chambers shipped to UCLA FAST Site	06/17/02	On Track
1.10.1.2.8	51 Chambers shipped to UCLA FAST Site	09/16/02	On Track
1.10.1.2.9	56 Chambers shipped to UCLA FAST Site	09/16/02	On Track
1.10.1.3.1	21 Chambers shipped to UF FAST Site	12/17/01	Achieved
1.10.1.3.2	26 Chambers shipped to UF FAST Site	12/17/01	Achieved
1.10.1.3.3	31 Chambers shipped to UF FAST Site	03/15/02	Achieved
1.10.1.3.4	36 Chambers shipped to UF FAST Site	03/15/02	Ready to
1.10.1.3.5	41 Chambers shipped to UF FAST Site	06/17/02	On Track
1.10.1.3.6	46 Chambers shipped to UF FAST Site	06/17/02	On Track
1.10.1.3.7	51 Chambers shipped to UF FAST Site	09/16/02	On Track
1.10.1.3.8	56 Chambers shipped to UF FAST Site	09/16/02	On Track



FNAL FY02 SOW Milestones (3/4)

WBS	Program Milestones	Current Milestone Date	Status
1.10.2.2	38 ME3/1 CSC kits shipped to PNPI	01/31/02	Achieved
1.10.2.3	38 ME4/1 CSC kits shipped to PNPI	04/30/02	Achieved
1.10.3.1	74 ME1/2 CSC kits are shipped to IHEP	10/30/01	Achieved
1.10.4.1.1	5 ME23/2 cooling plates are at UCLA	10/01/01	Achieved
1.10.4.1.2	5 ME23/2 cooling plates are at UF	10/01/01	Achieved
1.10.4.1.3	+5=10 ME23/2 cooling plates are at UCLA	12/15/01	Achieved
1.10.4.1.4	+5=10 ME23/2 cooling plates are at UF	12/15/01	Achieved
1.10.4.1.5	12 ME2/1 cooling plates at Fermilab ready to be shipped to PNPI	12/15/01	Achieved
1.10.4.1.6	12 ME1/2 cooling plates at Fermilab ready to be shipped to IHEP	12/15/01	Achieved
1.10.4.1.7	+5=15 ME23/2 cooling plates are at UCLA	02/15/02	Achieved
1.10.4.1.8	+5=15 ME23/2 cooling plates are at UF	02/15/02	Achieved
1.10.4.1.9	+12=24 ME2/1 cooling plates at Fermilab ready to be shipped to PNPI	02/28/02	Achieved
1.10.4.1.10	+12=24 ME1/2 cooling plates at Fermilab ready to be shipped to IHEP	02/28/02	Achieved
1.10.4.1.11	+10=25 ME23/2 cooling plates at UCLA	03/31/02	Achieved
1.10.4.1.12	+10=25 ME23/2 cooling plates are at UF	03/31/02	Achieved
1.10.4.1.13	+14=38 ME2/1 cooling plates at Fermilab ready to be shipped to PNPI	05/15/02	Achieved



FNAL FY02 SOW Milestones (4/4)

WBS	Program Milestones	Current Milestone Date	Status
1.10.4.1.14	+12=36 ME1/2 cooling plates at Fermilab ready to be shipped to IHEP	05/15/02	Achieved
1.10.4.1.15	+10=35 ME23/2 cooling plates are at UCLA	06/15/02	Achieved
1.10.4.1.16	+10=35 ME23/2 cooling plates are at UF	06/15/02	Achieved
1.10.4.1.17	12 ME3/1 cooling plates at Fermilab ready to be shipped to PNPI	07/15/02	Achieved
1.10.4.1.18	+12=48 ME1/2 cooling plates at Fermilab ready to be shipped to IHEP	07/15/02	Achieved
1.10.4.1.19	+10=45 ME23/2 cooling plates are at UCLA	08/31/02	Achieved
1.10.4.1.20	+10=45 ME23/2 cooling plates are at UF	08/31/02	Achieved
1.10.4.1.21	+12=24 ME3/1 cooling plates at Fermilab ready to be shipped to PNPI	09/30/02	Achieved
1.10.4.1.22	+12=60 ME1/2 cooling plates at Fermilab ready to be shipped to IHEP	09/30/02	Achieved

- **62 Milestones associated to FNAL-TD Personnel in FY02**
 - 44 Achieved by Jun. 1st '02
 - 15 On Track
 - 3 Delayed



Conclusion

- **FNAL Factories and Shipment Activities**

Lab 8

Initiating

Planning

Executing

Controlling

Closing

MP9

Initiating

Planning

Executing

Controlling

Closing

- Activities proceeding according to plans. Less than ~300 days to go for major activities at FNAL.
- FNAL Shipments to US FAST Sites completed (*modulo* chambers)
- Foreign Chamber & Un-machined Frame Parts Shipments proceeding according to the plans.
 - 75% of PNPI/IHEP Shipments at destination or in transit
- FAST Sites “*Parts Flow*”
 - New task Manager (O. Prokofiev).
 - Cooling Plate procurement almost completed.
 - Waiting for ME1/3 Integration Configuration Control.